Claims

1. A method for the optimization of multi-objective problems using evolutionary algorithms, the method comprising the following steps:
- setting up an initial population as parents (S1),
- reproducing the parents to create a plurality of offspring individuals (S2, S3),
- evaluating the quality of the offspring individuals by means of a fitness function (S4), wherein the fitness function is composed of the sum of weighted sub-functions that represent an objective,
- selecting the offspring(s) having the highest evaluated quality value as parents for the next evolution cycle (S5),
characterized in that
during the optimization the weights for the sub-functions are changed dynamically respectively within a predefined interval for every weight.

2. Method according to claim 1,
characterized in that
human preferences represented by linguistic preference relations are converted into parameterized, real-valued preferences relations to generate the intervals defining the allowed range of weight changes.

3. Method according to claim 2,
characterized in that
the parameterized preference relations are converted into real-valued intervals by letting the parameters take all the allowed value instead of assigning one specific value to each parameter.

4. Method according to anyone of the preceding claims, characterized in that
the weights for the different objectives are randomly re-distributed within the defined intervals among the different offspring individuals in each generation.

5. Method according to anyone of claims 1 to 3, characterized in that
the weights for the different objectives are changed gradually within the defined intervals with the proceeding of optimization.

6. Method according to claim 5, characterized in that
the weights are changed within the intervals according to a periodic function.

7. Method according to claim 5 or 6, characterized in that
each offspring has the same weight in the same generation.

8. Method according to anyone of claims 5 to 7, characterized in that
the periodic change has the shape of a sine function applied on the generation number.

9. Computer software program product, characterized in that
it implements a method according to anyone of the preceding claims when run on a computing device.

10. Use of a method according to anyone of claims 1 to 8 for the optimization of aerodynamic or hydrodynamic bodies, wherein different objectives have to be taken into account,

e.g. pressure loss and outlet angle calculated by a Navier-Stokes solver and geometric constraints.